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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/671,002	09/27/2000	Brian Dennis McKean	SJ09-2000-0068US1	6634

7590 09/24/2002
ALTERA LAW GROUP L L C
10749 BREN ROAD EAST OPUS 2
MINNEAPOLIS, MN 55343

EXAMINER

BAKER, PAUL A

ART UNIT PAPER NUMBER

2187

DATE MAILED: 09/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Handwritten signature

Office Action Summary

Application No.

09/671,002

Applicant(s)

MCKEAN ET AL.

Examiner

Paul A Baker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 16-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 05 July 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- ☐ Interview Summary (PTO-413) Paper No(s). _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

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DETAILED ACTION

Claims 1-14 and 15-26 are presented for examination, claim 15 ^{has} ~~was~~ been withdrawn from consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5,7,14,16-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz et al US Patent 6,058,489 in view of Ofer et al. US Patent 5,887,199.

In regards to claim 1, Schultz discloses adding at least one drive to a system controller that controls a predetermined number of storage devices arranged in a digital array storage device to form a system drive in column 2 lines 43-64.

However, Shultz does not disclose the converting data in a first format type on the digital array of storage devices to a format of a second type on the added at least one drive. Ofer discloses a disk array where each drive may have its own block size (format) in column 1 lines 48-58. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. Since Schultz discloses the rearrangement of stripes of data when adding a drive in Figure 2A-2F, the conversion between formats would be required during this

operation when the added disk would be of a different format. The converted data would then be migrated from one disk to the added at least one drive. Therefore it would have been obvious to one skilled in the art at the time of invention to add a drive of one format to a disk array of a different format.

In regards to claim 2, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer explicitly disclose the formatting the drive in the second format type and then adding the drive to the array, it is well known in the art that a drive added to a computer system must be formatted before it can be used. Therefore, it would have been obvious to one skilled in the art to format the drive before adding it to the disk array.

In regards to claim 3, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the predetermined number of storage devices arranged in the digital array storage devices forming the system drive using the predetermined number of storage devices and the added first drive formatted in the second format type in Figure 2A-2F. Since Schultz discloses the addition of multiple drives in column 2 lines 51-53, the process shown in Figure 2A-2F could be performed by the addition of another drive as disclosed in claim 3 lines 6 through 9 and has been anticipated by Schultz. Therefore it would have been obvious to one skilled in the art at the time of invention to add another drive and migrate the data of first format type to second format type on the second drive.

In regards to claim 4, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 5, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 7, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 9, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 10, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 11, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 12, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 13, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

In regards to claim 14, Schultz discloses a plurality of storage devices forming a system drive formatted in a first format type in Figure 1 element 114E, and a system controller coupled to a plurality of storage devices for controlling the plurality of storage devices forming system drive in Figure 1 element 10. However Schultz does not disclose at least one drive formatted in a second format type, coupled to the system controller, wherein the system controller converts data in a first format type on a plurality of storage devices to a format of a second type on the at least one additional drive. Ofer discloses converting a first format type to another in column 1 lines 48-57. Ofer discloses the benefits of maintaining a disk array where the disks have different formats as having flexibility and adaptability in column 1 lines 8-15. The converted data would then be migrated from one disk to the added at least one drive. Therefore, it would have

been obvious at the time of invention to convert data in the first format type to data of a different format on a different drive.

In regards to claim 16, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the re-laying out data stored on the plurality of storage devices in Figure 2A-2F. Schultz discloses the addition of one or more drives in column 2 lines 51-53. Ofer discloses the conversion of one format to another in column 1 lines 48-58. In the migration, the conversion between formats would be required during this operation when the added disks would be of a different format. Therefore, it would have been obvious at the time of invention to add one or more drives of another format and migrate the data from the first format to the second format.

In regards to claim 17, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migration being performed by the system controller using a background process in Figure 5.

In regards to claim 18, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses data writes to both one of the predetermined number of storage devices and the added second drive during the migration performed by the background process in column 2 lines 45 through 49.

In regards to claim 20, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the migrating is performed by the system controller using a regeneration function when one of the predetermined number of storage devices fails before the migration has completed in column 22 lines 37-40.

In regards to claim 22, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the use of RAID 1 in column 2 lines 41-43 this RAID level provides a mirror of each drive, Since Ofer provides the possibility of drives having different formats in a disk array, it would have been obvious at the time of invention to select drives to create a mirror system where the mirror drive is of a second format.

In regards to claim 23, Schultz and Ofer disclose the invention substantially as claimed. In the creation of RAID 1 as disclosed by Schultz, the conversion of one format to another as disclosed by Ofer would be required when the mirror drive is of a different format. Therefore, it would have been obvious at the time of invention to copy data from the predetermined number of storage devices in a first format to the mirror drive in a second format.

In regards to claim 24, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the ability to perform writing to the disk array system during copying in column 2 lines 45-48.

In regards to claim 25, Schultz and Ofer disclose the invention substantially as claimed. Schultz further discloses the removal of a disk from the array in column 2 line 65 column 3 line 1.

In regards to claim 26, Schultz and Ofer disclose the invention substantially as claimed. Ofer further discloses drives with 512 or 520 bytes per sector in column 1 lines 59-62 and by the title "Mass storage controller with universal track size adaptability" indicates any sector (track) size is anticipated.

Claims 6, 8, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz in view of Ofer as applied to claims 3, 2, 16 and 15 above, and further in view of Stallmo et al. US Patent 5,875,456.

In regards to claim 6 and 19, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive after migration, then the addition of an additional drive of the second format with the migration from another drive to the added drive. More specifically neither Schultz nor Ofer disclose the serial operation of migration, removal, addition, and migration. Stallmo discloses the adding and/or deleting of disks from the managed set of disks in column 10 lines 6-11. Since Stallmo specifies the alternate and conjunctive forms he foresaw removal and addition of disks in one general operation in the same field of endeavor of disk array expansion and contraction. Given Stallmo's disclosure of removing and adding disks in a general operation in the context of Schultz and Ofer, it would have been obvious at the time of invention to one skilled in the art to remove a drive after migration with the addition of another drive of the second format and the further migration to the additional drive.

In regards to claims 8 and 21, Schultz and Ofer disclose the invention substantially as claimed. While neither Schultz nor Ofer disclose the removal of a drive, reformatting the drive to a second format then the replacement into the array for reconstitution via regeneration function. In the instance of a soft failure of a drive in the system of a mixed format it would be obvious upon determination that the drive can be reused, to reformat the drive in the second format and add the drive to the array for

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reconstitution of the drive. Therefore it would have been obvious at the time of the invention to remove the drive, reformat the drive to the second format and reconstitute the drive using RAID parity information.

Response to Amendment

The examiner reverses his objection to the use of the term "digital array storage device(s)" the commonly accepted meaning of DASD is "direct array storage device(s)" and should not be confused with the applicants use of a phrase which would produce an identical acronym since the applicant defines DASD as "direct array storage device(s)." Also the applicant may be their own lexicographer, see *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947)

In regards to the applicants traversal of rejected claims 1 and 14, Schultz discloses the adding of disks to a RAID array. Ofer gives a motivation to incorporate dissimilar drives into a drive array in column 1 lines 8-15. While Ofer is primarily concerned with conversion of data external to the drive system, Ofer discloses the controller's ability to support disks of a different format size in column 3 lines 3-6. Ofer discloses a means of conversion between drives containing different sector sizes. An obvious modification to Ofer is to provide conversion between drives on the same system as suggested is possible in column 3 lines 3-6. The benefits of adding drives to a RAID array are well known in the art (as disclosed in Shultz). By adding a drive to an RAID array, migrating RAID stripes is necessary and hence the conversion of data as outlined in Ofer is required when transferring a stripe between drives which have

dissimilar sector sizes. Therefore the examiner maintains the validity of combining Shultz with Ofer and the rejection of claims 1-14 and 16-26.

In regards to the amended portion of claims 1 and 14, when adding a drive onto a RAID system containing varying sector sizes, restriping the data is necessary. Since the stripes are moved from one sector size to another, the data is converted to accommodate moving the data from one drive to another as shown in Schultz figures 2a-2f.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A Baker whose telephone number is (703)305-3304. The examiner can normally be reached on M-F 8am-4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Do Yoo can be reached on (703)308-4908. The fax phone numbers for the organization where this application or proceeding is assigned are (703)746-7238 for regular communications and (703)746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

PB

September 23, 2002



DO HYUN YOO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100